

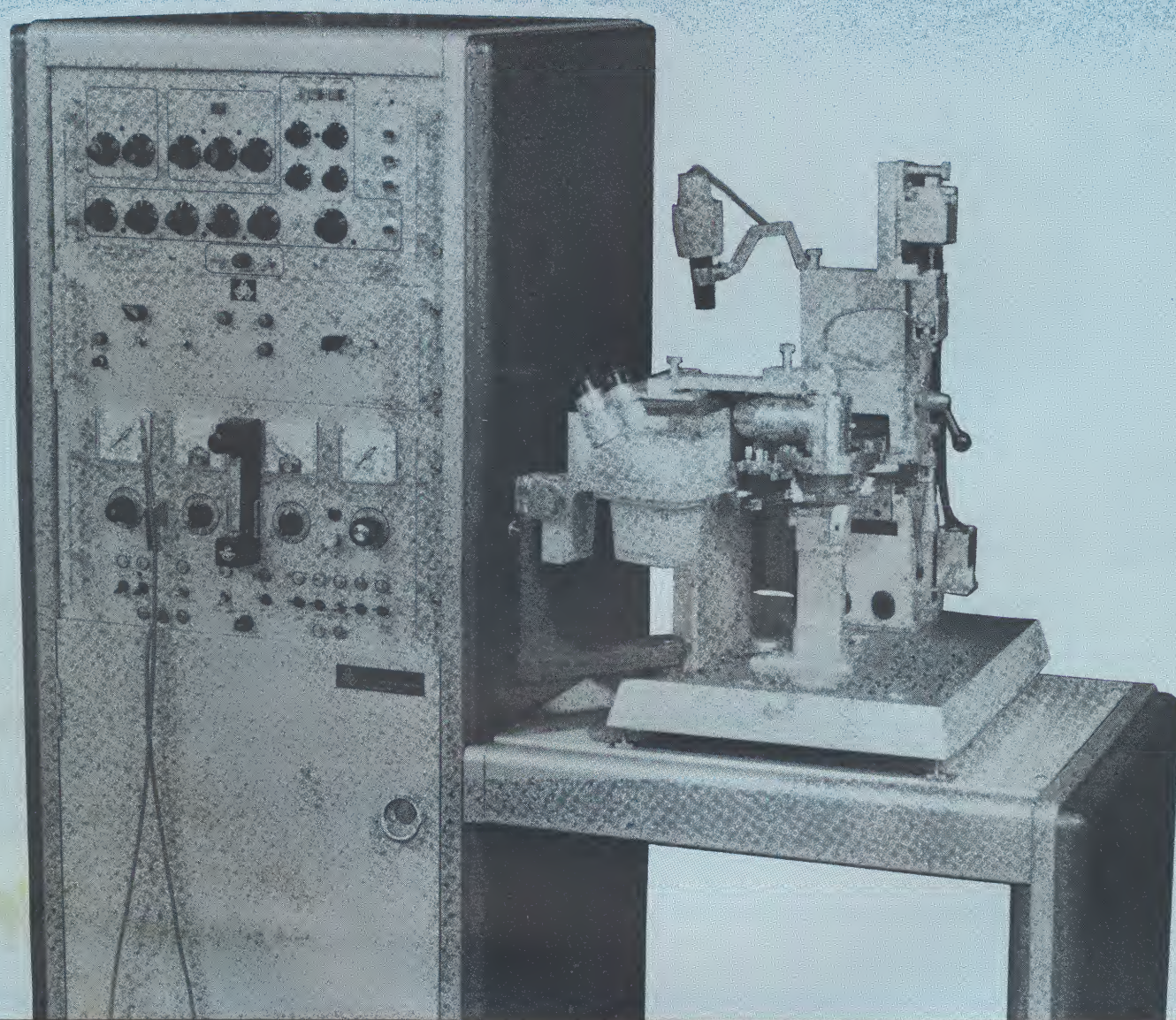


S.S. WHITE COMPANY
Industrial Division

Bulletin 6610-A

AIRBRASIVE[®] RESISTOR TRIMMING SYSTEM

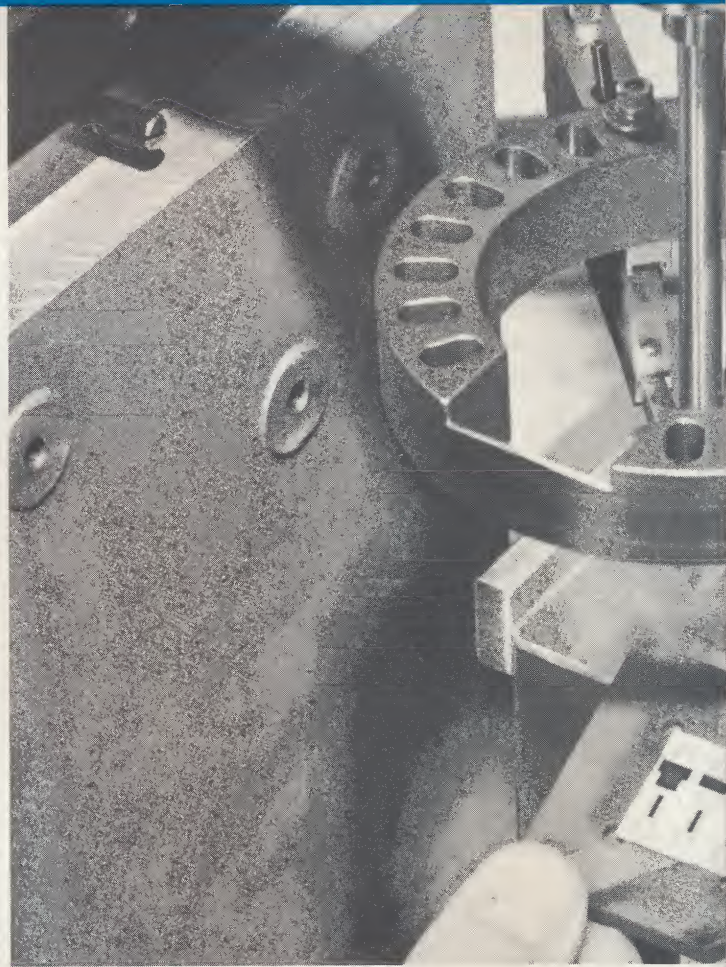
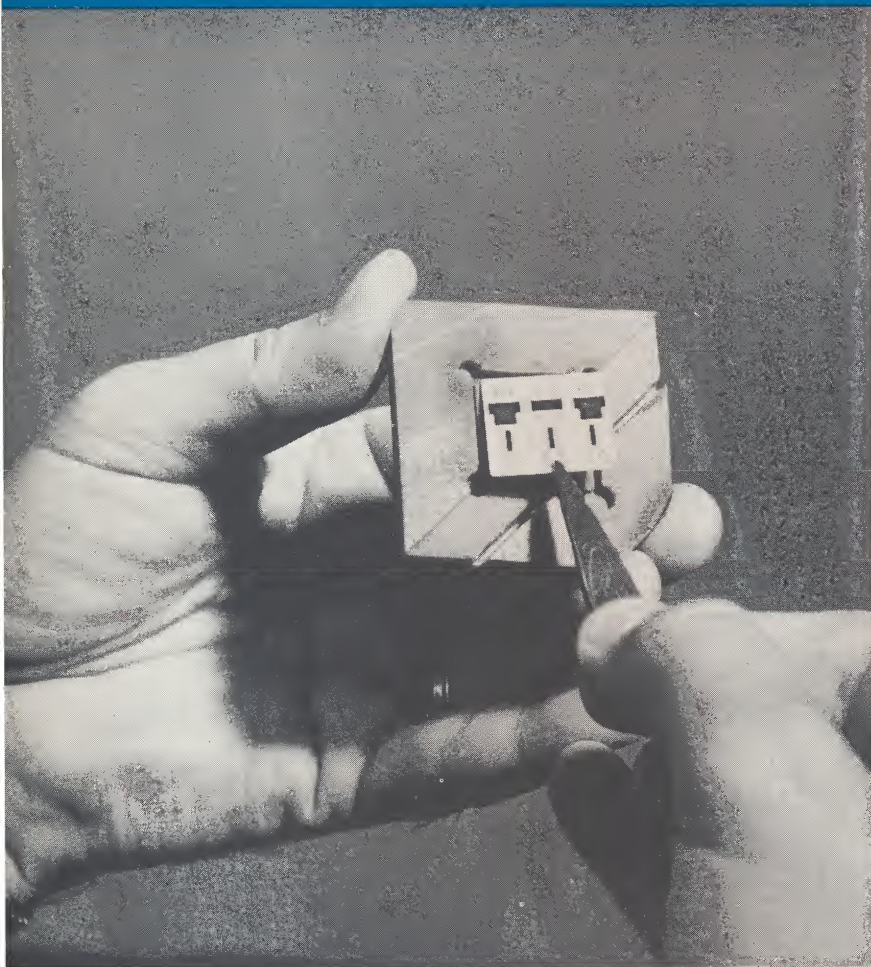
MODEL AT-701



*A complete system for the
automatic adjusting of microresistor elements, both thick
and thin films, in hybrid microelectronic circuits.*

Microresistor elements are loaded manually in the holding fixture of the S. S. White Airbrasive Trimmer. The fixture is then inserted in the slide mechanism.

The microresistor holding fixture Model AT-701. (The dust collector for better visibility of parts.) A special fixture holds the module rigidly in the preset position.



The S.S. White Trimming System for resistors and other elements, Model AT-701, is a complete system for the automatic adjusting of microresistor elements, both thick and thin films, in hybrid microelectronic circuits.

It semi-automatically positions the module, measures the resistor for a minimum value, trims the films to a pre-set "stop" value, and then performs a high-low acceptance check on the finished element.

The trimming of the fired-on resistor is accomplished by the S.S. White Airbrasive process. This miniature abrasive jet results in a clean, accurate, noise-free trim. The process is cool, shock-free, and cannot affect the substrate.

Trimming speed Resistors can be measured, trimmed, and checked at the rate of from one every second to one every three seconds, depending on the size and amount of the film materials to be removed. On the Model

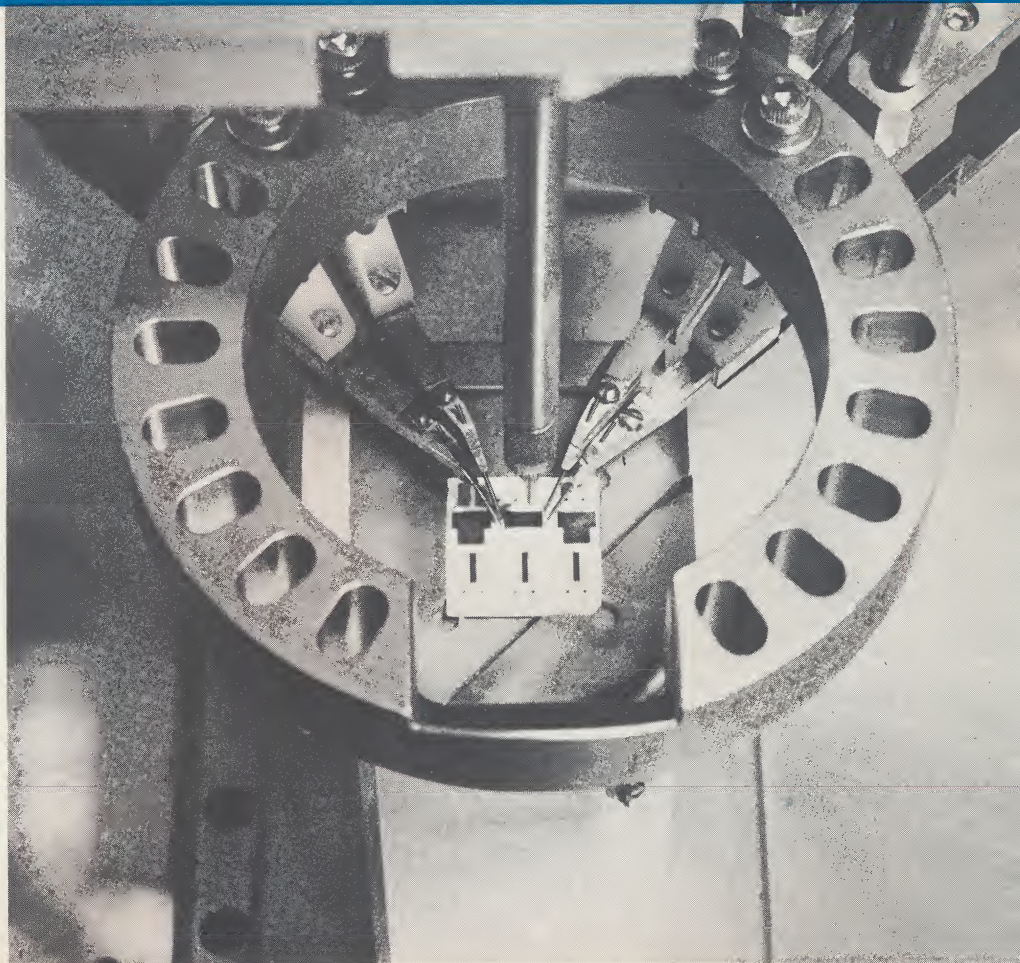
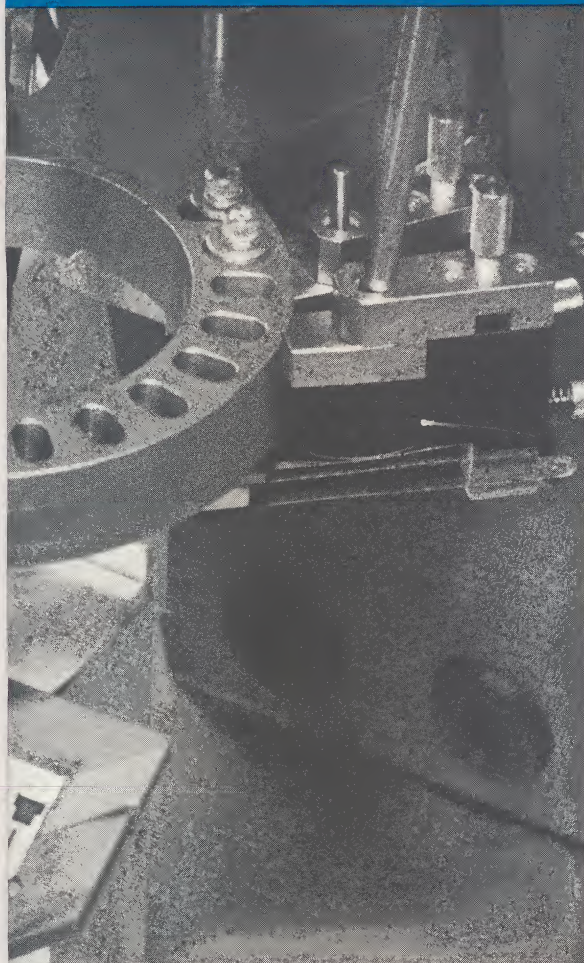
AT-701 modules are manually fed to the system. Positioning is semi-automatic. Production rate is therefore dependent on the operator efficiency.

Tolerances The Automatic Resistor Trimmer can adjust to within 1% or less of required value.

Complete system The Model AT-701, Airbrasive Resistor Trimmer is a complete, self-contained system. It consists of a precision bridge which monitors the trimming process; the slide mechanism and its associated controls for positioning the Airbrasive nozzle; the Airbrasive complex and dust collector. The Model AT-701 is a single position system capable of performing the entire trimming and checking operation on a single resistor element. Future S.S. White models will contain

is manually inserted in the
g components have been removed
ing-loaded mechanism will hold
sition under the probes.

The microresistor holding fixture shown in place in the Airbrasive Trimmer slide mechanism (with dust collector removed). The probes, which are pre-set for position, automatically make proper contact with the conductor elements in the resistor. The ring of the slide mechanism has 18 position holes for complete adjustability. The zero position of the abrasive jet and its limit of travel are electronically dialed in and locked.



additional positions for the simultaneous trimming of multiple resistor elements.

Precision bridge A highly precise, 4-wire resistance limit bridge is integral to the system. It controls the trimming process at a single trimming position. After the module is placed under the probes, the element is measured by the bridge. If it is within the acceptable value range, a trim command is given by the bridge, which then monitors the trimming process by continuously measuring the resistor value. When a preset "stop" value is reached, the trim command is removed. After an adjustable time delay, the resistor is checked by the bridge for the final value. If it is within the programmed tolerance limits, the resistor is accepted. If the initial check indicates a value above the "stop" value, the trim command is not given and the final acceptance measurement is performed immediately. If the check indicates that a

resistor value is below the acceptable value, the trim command is not given and the resistor is rejected.

Bridge controls give the operator a broad programming range, with a color lamp display system to indicate successive stages of the trimming process. Final values can be programmed through 5 digits and 4 multipliers, giving four ranges from 0 to 10K through 0 to 10M. Final value tolerance limits can be set in ranges from 0 to $\pm 11\%$, with a resolution of 0.1%. Stop value is programmed as a negative percentage of final value with a range of 0 to 11.1% and a resolution of 0.01%. Panel controls also enable the operator to over-ride the automatic cycle, adjust time delay between "stop" and final test, and make manual reading of the final value.

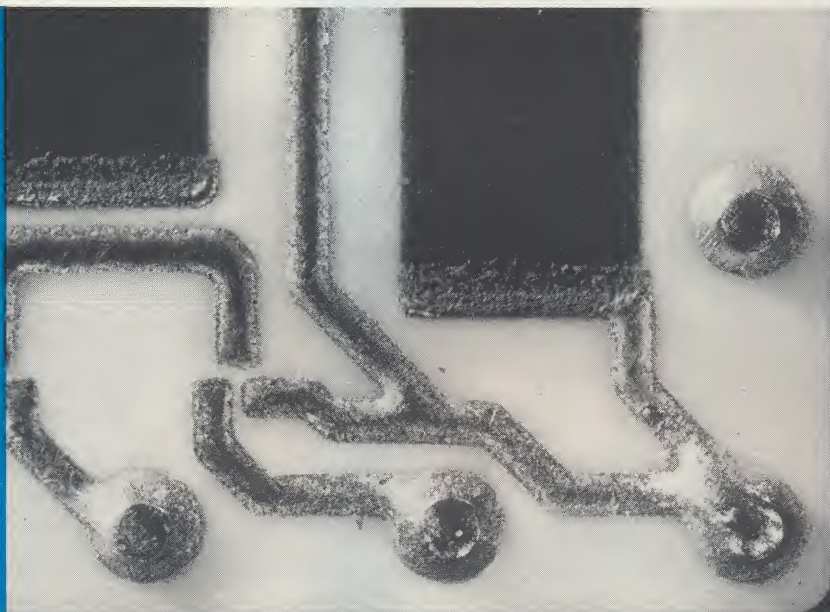
Slide Mechanism The module is rigidly held in a preset position under the probes by a spring-loaded mechanism. A high-precision, motor-driven slide moves

the Airbrasive jet over the resistor element on trim command. When the stop command is given, the slide stops its traverse and the Airbrasive jet flow ceases. The repositioning of the nozzle and its travel limit can be dialed in electronically. The new zero position is locked in. The probes are tungsten carbide, held in an 18-position probe mounting ring and are adjustable in position. Slide mechanism speed is a maximum 0.150 in./sec., and a minimum is 0.005 in./sec., an accuracy of $\pm 95 \times 10^{-6}$ in./in. of travel at 68F.

Abrasive jet process The S.S. White Airbrasive process has long been a standard in the microelectronic

industry. It has been used to adjust microresistors and capacitors, strip connectors, clean surfaces, and for many other precision operations on fragile materials. This is the first time, however, that the Airbrasive process has been available in a complete resistor trimming system.

Basically, the process involves a miniature abrasive jet of gas-propelled particles which quickly removed fired-on resistor film, or other conductive elements, without harming the substrate. For resistor trimming the 27 micron aluminum particle (S.S. White Airbrasive Powder No. 1) is recommended.



ACTUAL
SIZE



This microresistor has been trimmed by Airbrasive process to within 1% of specified value. Now the Airbrasive process is available in a complete resistor trimming system in the S.S. White Airbrasive resistor trimmer.

For more information write or call collect...



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